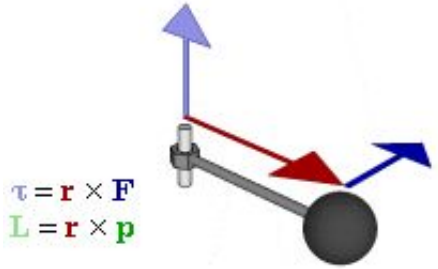
Robot Mobility

By: Kyle Budgell

Torque vs. Speed

Speed: The speed of the motor, at its most basic form, is the rate at which the motor spins. The speed of an electric motor is measured in RPM (rotations per minute).

Torque: The torque output of a motor is the amount of rotating force the motor develops.The torque is measured in pounds per force inch (lb-in).



Why are gears important in designing robotics?

Gears have cut teeth designed to mesh with teeth on another part so as to transmit or receive force and motion. Gears are used to transfer rotational forces between axles. They can also change speed and direction.

Drive Train Systems

There are four different types of drive train systems:

Direct Drive: There's no traditional gearbox, and it requires the motor in the direct-drive actuator to be able to produce enough native torque at a usable speed.

Belt Drive: A belt is a loop of tough, flexible material like rubber and kevlar with a series of teeth that mesh with the teeth on specially designed pulley wheels to put together two or more rotating shafts.

Chain Drive: A chain drive is a way of transmitting mechanical power from one place to another. It's often used to bring power to the wheels of a vehicle.

Geared Drive: Suitable for low speed robots because they enable motors to operate at high speed and lower torque.

Motor Types

Stepper motor: a widely used type of engine used in robotics and 3D printers. They convert an electrical pulse in an angular movement called steps. The advantage that they have is that they have a potentially high torque and are quite accurate.

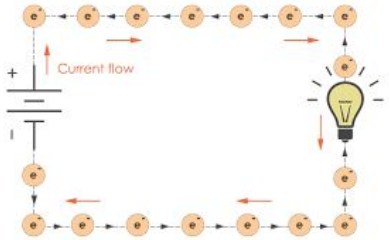
Servo motor: a precise and powerful way of converting rotational motion into linear motion. They can be used in robotic vehicles, and robotic limbs.

Basic DC Drive: Basic DC motors are low powered, meaning that the robot can be battery powered, and it can offer many advantages for robot applications (specifically mobile robots and collaborative robots)

Electrical Power in Robotics

First of all, voltage is the difference in charge between two or more points. Current is the rate at which the electricity is flowing.

In direct current, (DC), the current only flows in one direction. In alternating current, (AC), the current changes direction all the time.



Some common power sources for robots are: lead acid batteries, silver cadmium batteries, rechargeable batteries and disposable batteries.

Where I got my information!

https://www.robots.com/articles/robot-power-sources#:~:text=The%20main%20sources%20of%20electrical,as%20are%20silver%20cadmium%20batteries.

https://learn.sparkfun.com/tutorials/alternating-current-ac-vs-direct-current-dc/all#:~:text=In%20direct%20current%20(DC)%2C,because%20the%20current%20changes%20direction.

https://www.motioncontrolonline.org/blog-article.cfm/Benefits-of-DC-Motors-and-Why-They-re-Great-for-Robotics/82#:~:text=At%20the%20most%20basic%20level,particularly%20mobile%20and%20collaborative%20robots.&text=The%20drive%20electronics%20of%20these%20motors%20actually%20work%20from%20a%20DC%20source.

https://www.motioncontrolonline.org/blog-article.cfm/Servo-Motors-Explained-and-Why-They-re-Useful-in-Robotics/87#:~:text=They%20are%20used%20in%20robotic,disarm%20and%20dispose%20of%20bombs.

https://www.generationrobots.com/en/295-stepper-motors-for-robotics#:~:text=Stepper%20moto[illegible]%20are%20a%2[illegible]lass,torque%20and%20are%20quite%20accurate.